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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/698,546	11/03/2003	Naokatsu Ikegami	OKI.153DC	9945
20987 7590 04/09/2007 VOLENTINE FRANCOS, & WHITT PLLC ONE FREEDOM SQUARE 11951 FREEDOM DRIVE SUITE 1260 RESTON, VA 20190			EXAMINER CHEN, KIN CHAN	
			ART UNIT 1765	PAPER NUMBER
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		04/09/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/698,546

Applicant(s)

IKEGAMI, NAOKATSU

Examiner

Kin-Chan Chen

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 February 2007.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 12-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination (RCE) under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 22, 2007 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 12-17 are rejected under 35 U.S.C. 103(a) as obvious over Watatani (US 6,153,511) in view of Chen et al. (US 6,352,938) as evidenced by Sugahara et al. (US 5,989,998).

In a method for fabricating a semiconductor device, Watatani teaches that a low-dielectric, organic insulating layer (e.g., organic SOG) may be formed over an

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interconnect layer. A contact hole may be formed in an organic insulating layer (e.g., organic SOG) so as to expose the interconnect layer using a patterned resist layer formed over the organic insulating layer as a mask. The patterned resist layer may be ashed (Figs. 5A-5I; col. 7, lines 7-11). Watatani teaches removing photoresist by ashing. Watatani is not particular about the etchant. In a method for stripping photoresist, Chen (abstract; col. 4, lines 8-10) teaches that a mixed gas consisting of nitrogen, oxygen and hydrogen (such as $N_2H_2 + O_2$, same as that disclosed in applicant's dependent claims) may be used for ashing to strip the photoresist from a low dielectric constant (low-k) dielectric layer. The disclosure of Chen is not limited to any particular low dielectric material, therefore, making commonly used low dielectric organic SOG insulating layer obvious. Hence, it would have been obvious to one with ordinary skill in the art to use oxygen and a mixed gas containing nitrogen and hydrogen (such as N_2H_2) as taught by Chen in the process of Watatani for ashing in order to effectively remove the photoresist from a low-k dielectric layer.

The claimed invention differs from the combined prior art by specifying forming a protective film on a surface of the contact hole during the ashing wherein the protective film is formed by reacting the organic insulating layer (e.g., organic SOG) with the nitrogen. However, because the same materials are used with the same process, it is expected that the method of the combined prior art would possess the claimed characteristic and properties, such as forming the protective by reacting the organic insulating layer with the nitrogen.

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Claim 15 differ from the prior art by specifying conventional materials and process (such as forming organic SOG by adding alkyl group to a silicon oxide) to the art of semiconductor device fabrication. A person having ordinary skill in the art would have found it obvious to modify the combined prior art by adding any of same conventional materials and process to same in order to form the organic SOG with a reasonable expectation of success, see Sugahara et al. (US 5,989,998) in the record as evidence.

Response to Arguments

4. Applicant's arguments with respect to claims 12-17 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Sugahara et al. (US 5,989,998; col. 3, lines 25-42) discloses that organic SOG may be formed by adding alkyl group to a silicon oxide.

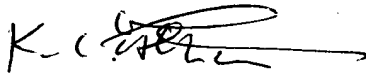
6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kin-Chan Chen whose telephone number is (703) 305-0222. If attempts to reach the examiner by telephone are unsuccessful, the examiner's

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supervisor, Nadine Norton can be reached on (703) 305-2667. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-2934.

April 2, 2007


Kin-Chan Chen
Primary Examiner
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